ACKNOWLEDGEMENT

Science is magic with hidden logic...

During my graduation days when we were away from the hubbub of the classroom, trekking in the hinterland of Taranga hills to study granites, little did I realise that I was actually sowing the seeds for my future research. Interestingly, having explored sedimentary rocks during my master's dissertation, my love for understanding the same grew exponentially. The journey to understand these commenced when I initiated my work at PRL and started Re-Searching research. With each field trip presented its own difficulties that tested my patience, while the outcome was equally rewarding with discoveries and lessons. Finally, here comes the day when all the memories sift by, thinking of the people who pulled me up, stood by me and helped me go through all the ups and most importantly the never ending downs.

I owe this Ph.D to a number of people who contributed in some way or the other. To begin with, I extend my gratitude to my guide Prof. D.M. Maurya whose experience and suggestions took my research to another level. Prof. Maurya has not only guided me but his kind words has always exhilarated till the end of my research. Though, I initiated my research under the guidance of Late Prof. N.D. Desai, who was very cooperative and helpful all through my PhD. However, his untimely demise saddened me and made me feel as if my research will stagnate. But by god's grace, my passion for research saw a new dawn and I was introduced to Prof. Maurya who agreed to supervise my PhD work. Accomplishment of PhD is a combination of exploration of new realms and systematic completion of countless managerial procedures. This acknowledgement will be incomplete if do not express my gratitude

towards **Prof. L.S. Chamyal**, HOD, Geology Department and **Prof. P.C. Mankodi**, HOD, Zoology Department, Faculty of Science, M.S University of Baroda for guiding me with the myriad administrative formalities.

My re-search work commenced at PRL in collaboration with Dr. Ravi Bhushan and Dr. Navin Juyal. I am extremely indebted to Dr. Ravi Bhushan who introduced me to the world of geochemistry and the realms of dating techniques and instrumentation. His constant discussions, encouragement and positive attitude towards facing problems has helped me during the dawn and dusk of my PhD years. I am indebted to Dr. Navin Juyal who acquainted me with the concepts of coastal geomorphology and Holocene climatic history. His enthusiasm towards the subject and dynamic working attitude instilled in me the ethic of working vigorously and efficiently. The concepts and discussions seeded by Ravi sir and Navin sir became the foundation for my entire research

I extend my great sence of gratitude towards **Prof. J.N. Goswami**, Former director of Physical Research Laboratory for allowing me to include part of GEOTRACES Project as my thesis research. Acknowledgement is also made to GEOTRACES Project for funding the research without which it won't have been possible to conduct field trips and analysis. While working in PRL I got the opportunity to interact with some of the renowned scientists. The most eminent being Late **Prof S. Krishnaswami**, his presence in the lab was enough to inspire every student to think of something new and innovative. **Prof. M.M. Sarin** is known to be a perfectionist who's organisational and management skills and concern towards the lab discipline has always inspired me to adopt such qualities. I am also thankful to **Prof. Sunil Kumar Singh**, for sharing his knowledge of geochemistry that has helped me to understand the

behaviour of various elements used as proxy for climatic reconstructions. Maintaining lab courtesy was the foremost thing required for personal safety and wellbeing which I learnt from **Dr. R. Rengarajan**. His concern for my research encouraged me to complete my PhD at the earliest. I am also thankful to **A.K Sudheer** for suggestion and guidance in achieving best results with enhanced data quality.

Area seminar of Geosciences Division (GSDN) were always a cause for panic amongst students. Though I was a PhD student of M.S. University, Dr. N. Rastogi encouraged me to present my research work during GSDN area seminar. I extend special thanks to Dr. N. Rastogi for providing me such oppurtunity due to which I could get fruitful inputs and constructive suggestions from scientists and professors of the GSDN. I am also thankful to Prof. R. Ramesh, Dr. M.G. Yadava, Prof. J.S. Ray, Dr. S. Kumar, Dr. A. D Shukla, Dr. V.Rai, Mr. R.A. Jani and Mr. D. Kameshwara Rao for their suggestions and inputs during the area seminar. I also thank Mr. P.R. Adhyaru, Mr. Manan Shah and Mr. Lakhan for their help and support during any technical problem with the instruments or in the lab. I profusely thank all my seniors Dr. Vineet (Vinny Bhaiya), Dr. Prashant, Dr. Srinivas, Dr. Satinder and Dr. Jayati for their constant discussions and suggestion during my initial days of my PhD tenure. I extend special thanks to Dr. Prashant and Dr. Vineet, for teaching me the basics of chemistry in spite of their busy schedule. I thank Dr. Srinivas for making me aware of the problems in research initially faced by every student and encouraging me to confront it boldly. I sincerely thank **Dr. Banerjee** (Retired Geologist, Geological Survey of India, Gandhinagar) and **Dr. Batuk** for proof reading my thesis and providing me fruitful suggestions and ideas that has improved the aesthetic and the language of the thesis.

The stepping stone for any paleoclimatic study is based on chronology. Therefore, it gives me immense pleasure to acknowledge the fruitful collaboration with Prof. A.J.T. Jull, of NSF-AMS Facility, University of Arizona for providing me with AMS dates. The isotopic data has given a new direction to the present study for which I am extremely thankful to Dr. R. Agnihotri of Birbal Sahni Institute of Paleobotany, Lucknow. I also thank Dr. Agnihotri for his prolific discussions and suggestions. I extend a special thanks to Dr. Shilpa Pandey for carrying out the palynological study on the relict mudflat section.

Friends are an important part of life, and my PhD years would not have been as interesting as it was without the support of my lab members and the most unforgettable friends. I am extremely thankful to Sneha, Balaji, Aslam, Damodararao, Venkatesh, Shraddha, Ikshu, Anirban, Saweeta, Tripti and Vaishali to whom I was introduced when I came to PRL. Balaji and Bhavsar Bhai had taught me the procedures and protocols I followed during sample processing. Moreover, constant discussions and suggestion given by Balaji had always boosted me in interpreting data unconventionally. I am also thankful to Bhavsar bhai for teaching me simple techniques and lab etiquettes. Sneha has always been on my side come rain or shine, I am extremely thankful to her for constant and unforgettable support. As the time passed I was also introduced to Dr Rupali, Shubhanand, Chandana, Chinmay, Utsav, Jaldhi, Anil, Wriju, Preksha, Dr. Sajid, Priyanka, Prabhuti, Abhishek and Jivesh. Their company during breakfast, lunch, tea and snacks not only refreshed my mind during thesis writing but egged me on to submit it at the earliest.

I am also thankful to faculty members of other divisions of PRL such as from Atomic Molecular and Optical Physics, I sincerely thank **Prof. A.K. Singhvi**, for

introducing me to the world of research during my Summer Internship-2008, which had seeded an interest and excitement in me towards the paleoclimate research. I am greatly indebted to Dr. D. Chakraborty (Dipu Kaku) from Space and Atmospheric Science Division, for teaching me SPECTRUM and Table Curve Software in simple and layman terms that made me adept at using it to ascertain the periodicities for my data. I am also thankful to Prof. K.P. Subramanian (Subbu uncle), Dr. Bhas Bapat (Bhas uncle) and Prof. J. Banerjee (Banerjee Kaku) for their concern, support and encouragement during my PhD research. I am greatly indebted to Dr. S. Sharma (Som Uncle) for his kind words, suggestion and encouragement throughout my research tenure. I am also thankful to my friends Dr. Sneha, Deepak, Diptiranjan, Jinia, Bhavya, Lekshmy, Midhun and Dr. Trina from PRL who directly or indirectly supported me during my research tenure.

I am also thankful to Mr. Jigar Raval and his team from the Computer centre for providing help and support during thesis printout. I am extremely thankful to Dr. Nishtha Anilkumar and remaining library staff members who always managed to send me requested research article on time. I am also thankful to Mr. G.P. Ubale and his team from workshop for their assistance and cooperation in fabrication necessities and I also thank Mrs. Richa and the Het Chint staff members for providing timely and nutritious food for breakfast, lunch and evening snacks. I cannot forget the technical support and help provided by Pravinbhai and Rashmitbhai in maintaining the cleanliness of the lab during sample processing and analysis.

The idea of climatic reconstruction using coastal archive was invoked while working on coral reefs at Gujarat Ecological Education and Research Foundation (GEER F.). Therefore, I extend a deep sense of gratitude towards **Dr. C.N. Pandey**,

(Retired, PCCF, Govt. of Gujarat; Ex-Director, GEER F.), Mr. B.J. Pathak (Ex-Director, GEER F.), Mr. B.R. Raval (Ex-Dy. Director, GEER F.) and other staff members for introducing me to the professional life and helping me in learning various new things related to ecology. I am also thankful to my GEER F. friends such as Devanshi, Kalavanti, Bhamini, Dipikaben, Dr. Dishant, Dr. Sandeep, Dr. Virag, Yashpal, Jigneshbhai, Mehulbhai, Sunilbhai, for their support and encouragement. I extend my special thanks to Devanshi, Dr.Dishant and Dr.Sandeep for their scientific discussions and suggestion during my earlier days of PhD. I am extremely thankful to Mehulbhai for teaching me Corel Draw that has helped me in preparing figures and improving the aesthetic of my thesis.

It wouldn't have been possible for me to pursue a Doctoral degree in geology without the fundamental concepts of Geology. Therefore, I owe a debt of deep gratitude to my college professors Dr. R. D. Shah, Dr. N.Y. Bhatt and Dr. P.M Solanki (M.G. Science Institute, Gujarat University) for equipping me with a cardinal knowledge of Geology. College friends are one of the most unforgettable parts of life. During my PhD days, I was in contact with only few of them; Nimit was one of my college friends whose constant support, encouragement and tea treats from Roothraj's tea stall constantly kept me working even during the sad and depressing days of my PhD. I am extremely thankful to Nimit for his support. Dr. Janki (Janki Didi) and Praneeta (Pinni) have always been supportive even though I used to cancel my plans of getting together for citing my sample analyses and experiments.

Family and family friends are the ones who are known to us since birth and one of my family friends who is my foremost patrons is **Vyas Uncle** whose kind words of encouragement and just one sentence... "Or scientist... kab submit kar rahi ho" have

always motivated me to pursue my goal even when I had just initiated my work. I am also thankful to my Family, my Jethu (Apurva), Jamma (Aparna), Monu dada (Anup), Resh (Reshmi) and Bhai (Siddhant) for their constant support and encouragement. I extend my great sense of gratitude to my granny (thamma) and maternal granny (Bhaloma) for their blessings and constant prayers for me. Lastly, but not least, I am extremely thankful to Mummy and Babai for their love, concern, support and encouragement throughout my career. I cannot forget the moments when they both, scolded and pampered me like a schoolgirl because of my PhD work for which I could complete my research and thesis successfully...

Love you Mummy and Babai ...

इतनी शिद्दत से मैंने तुम्हें पाने की कोशिश की है... कि हर ज़र्रे ने मुझे तुमसे मिलने की साज़िश की है... कहते हैं...अगर किसी चीज़ को दिल से चाहो तो पूरी कायनात उसे तुमसे मिलाने की कोशिश में लग जाती है। आज आप सभी ने मुझे मेरी चाहत से मिलाया...

THANK YOU, THANK YOU SO MUCH.

(Om Shanti Om)